

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

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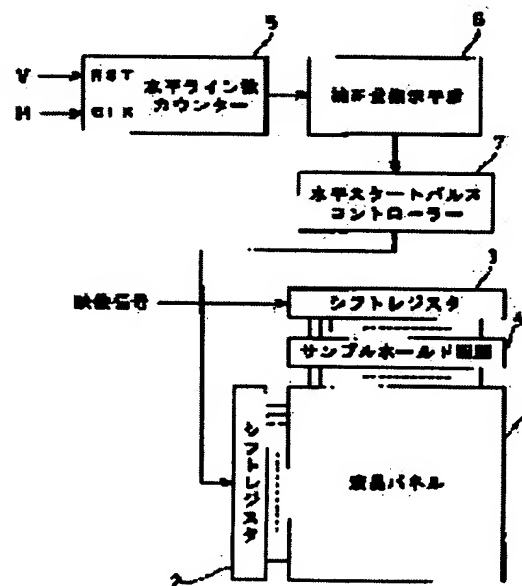
(72)Inventor : SUGATA TOSHIKI

(54) VERTICAL LINEARITY DISTORTION CORRECTION CIRCUIT FOR LIQUID CRYSTAL PROJECTOR

(57)Abstract:

PURPOSE: To provide a correction circuit for correcting the distortion of vertical linearity when the optical axis of a projection lens is inclined in the vertical scanning direction of a display screen by a prescribed angle as against an axis vertical to a screen surface in a liquid crystal projector.

CONSTITUTION: A line number counter 5 outputting a drive line, a correction quantity indication means 6 receiving the signal, and deciding in which vertical position video thinning, rewriting and simultaneous writing are executed and a horizontal start pulse controller 7 thinning a pulse in accordance with data from the correction quantity indication means 6, obtaining a start pulse and shortening or extending length in the vertical direction are provided. The vertical linearity distortion correction circuit of the liquid crystal projector, which projects a video for cancelling the vertical linearity distortion by inclined projection and corrects the vertical linearity distortion by using a means for thinning a video signal in accordance with the vertical position of the screen or writing twice continuous video information on the same horizontal line of a liquid crystal panel 1 and a means for scanning the same signal on more than two horizontal scanning lines is provided.



LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] The shift register which operates with the clock of predetermined frequency, and the sample hold circuit which samples and holds a video signal by making this shift register output into a sampling pulse, In a liquid crystal projector equipped with the liquid crystal panel driven with this sample hold circuit output Distortion of the perpendicular linearity at the time of only a predetermined include angle making the optical axis of a projection lens incline in the direction of a vertical scanning of a display screen to a shaft perpendicular to a screen side The perpendicular linearity distortion amendment circuit of the liquid crystal projector characterized by using for coincidence the means which thins out a video signal according to the vertical position of a screen, and a means to scan two or more horizontal scanning Rhine same signals, and amending linearity distortion.

[Claim 2] The shift register which operates with the clock of predetermined frequency, and the sample hold circuit which samples and holds a video signal by making this shift register output into a sampling pulse, In a liquid crystal projector equipped with the liquid crystal panel driven with this sample hold circuit output Distortion of the perpendicular linearity at the time of only a predetermined include angle making the optical axis of a projection lens incline in the direction of a vertical scanning of a display screen to a shaft perpendicular to a screen side The perpendicular linearity distortion amendment circuit of the liquid crystal projector which uses for coincidence the means which carries out writing of the image information which followed the same level Rhine of a liquid crystal panel in the video signal according to the vertical position of a screen twice, and a means to scan two or more horizontal scanning Rhine same signals, and amends linearity distortion.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the amendment circuit which amends the perpendicular linearity distortion in the liquid crystal projector of a complete projection mold.

[0002]

[Description of the Prior Art] Conventionally, since existence of the body of a projector may become the hindrance of interference of the projection image on a screen, to a screen, it incline, the body of a projector be arrange in many cases, and whenever [over a screen / angle of projection] do not serve as a right angle in this case, but distortion which screen axis of abscissa lay length differ by the upper and lower sides, and be call perpendicular linearity distortion also in the direction of an axis of ordinate of a screen as well as Lycium chinense generate the liquid crystal projector of a complete projection mold.

[0003] Drawing 2 shows radical Motohara ** of liquid crystal projector equipment. In drawing 2, as a component, 12 is a projection lens and 13 is a projection image when in a screen and 14 a field lens and 16 carry out the light source for projection and, as for 17, a liquid crystal panel and 15 carry out slanting projection of the projector from the upper part. About the liquid crystal projector equipment which consists of each above component, the incident light by which outgoing radiation was carried out from the light source 16 for projection is changed into parallel light by the field lens 15, and is irradiated by the liquid crystal panel 14. By carrying out expansion projection of the light which passed through the liquid crystal panel 14 with a projector lens 12, expansion projection of the image displayed on the liquid crystal panel 14 is carried out on a screen 13.

[0004] However, if the optical axis of a projector lens 12 carries out incidence at an angle of theta to a shaft perpendicular to the 13th page of a screen, distortion called perpendicular linearity distortion also in the direction of an axis of ordinate of a screen occurs as well as the keystone distortion of the configuration which makes the direction of a vertical scanning of the display screen top-most vertices and a base arising, and as shown in this drawing (b), the elongation of the perpendicular direction of an image differs in the upper part of a screen, and a lower part here. For this reason, in the slanting projection from the upper part, the screen lower part had the large elongation of the image of a lengthwise direction, and was a thing with vision top sense of incongruity, for example. Conventionally, several sorts of amendment approaches are announced to distortion of the direction of an axis of abscissa.

[0005]

[Problem(s) to be Solved by the Invention] Although the distortion of the direction of an axis of abscissa was amended and it was conventionally satisfactory in this way, to perpendicular linearity distortion, measures are not taken and there was a problem of the ability not to make the distorted image which is not appear.

[0006] With careful attention to said problem, this invention loses perpendicular linearity distortion and aims an image without vision top sense of incongruity at offer *****.

[0007]

[Means for Solving the Problem] The shift register to which this invention operates with the

clock of a predetermined frequency in order to attain the above-mentioned purpose, The sample hold circuit which samples and accumulates a video signal by making this shift register output into a sampling pulse, In the liquid crystal projector equipped with the liquid crystal panel driven with this sample hold circuit output at least Or it thins out a video signal according to the vertical position of a screen, it considers as the configuration which uses for coincidence the means which carries out writing of the image information which followed the same level Rhine of a liquid crystal panel twice, and a means to scan two or more horizontal scanning Rhine same signals.

[0008]

[Function] This invention changes perpendicular linearity according to a vertical position with the above-mentioned means, and it acts so that the image which offsets the perpendicular linearity distortion by slanting projection may be projected.

[0009]

[Example] In said liquid crystal projector equipment, if the image beforehand displayed by the liquid crystal panel for carrying out perpendicular linearity distortion amendment has linearity contrary to the aforementioned perpendicular linearity, the image which distortion is offset and does not have sense of incongruity should be acquired.

[0010] The perpendicular reality distortion amendment circuit of the one example liquid crystal projector of this invention is explained with reference to a drawing below. It is the sample hold circuit which samples a video signal and is held by making into a sampling pulse the output of the liquid crystal panel which drawing 1 is the block diagram of said amendment circuit, and is driven with the sample hold circuit output of the after-mentioned [1] as a component, the shift register which constitutes X driver to which 2 operates with the clock of predetermined frequency, the shift register which constitutes Y driver to which 3 and 4 similarly operate with the clock of predetermined frequency, and said shift register 3. Moreover, an amount directions means of amendments 5 is reset with a Vertical Synchronizing signal, and the number counter of level Rhine which counts a Horizontal Synchronizing signal, and 6 receive directions of the amount of amendments operated while an operator looks at a screen, and output the data according to the amount of amendments to the controller which controls the horizontal start pulse of a liquid crystal panel, and 7 are the level start pulse controllers which control a horizontal start pulse according to the data from the amount directions means 6 of amendments. Next, actuation of the perpendicular linearity distortion amendment circuit of the liquid crystal projector which consists of the above-mentioned component is explained. The number counter 5 of Rhine outputs first the signal which shows drive Rhine to the amount directions means 6 of amendments. The amount directions means 6 of amendments receives directions of the amount of amendments operated while an operator looks at a screen, determines by which vertical position infanticide (or overwrite) of an image and coincidence writing are performed, and sends the data to the level start pulse controller 7. The level start pulse controller 7 can shorten the vertical die length by culling out a video signal or building the same start pulse continuously by scanning the continuous video signal of two lines or more to the same level Rhine on a liquid crystal panel 1 by thinning out a start pulse according to the data from the amount directions means 6 of amendments. Moreover, coincidence is made to generate the start pulse of two or more continuous horizontal scanning Rhine, and the vertical die length can be extended by carrying out coincidence writing of the same signal to several lines. By the above actuation, the screen which offsets perpendicular linearity distortion is obtained on a liquid crystal panel.

[0011]

[Effect of the Invention] This invention can lose the perpendicular linearity distortion in slanting projection of a liquid crystal projector so that clearly from explanation of the above example.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application] This invention relates to the amendment circuit which amends the perpendicular linearity distortion in the liquid crystal projector of a complete projection mold.

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PRIOR ART

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EFFECT OF THE INVENTION

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Although the distortion of the direction of an axis of abscissa was amended and it was conventionally satisfactory in this way, to perpendicular linearity distortion, measures are not taken and there was a problem of the ability not to make the distorted image which is not appear.

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MEANS

[Means for Solving the Problem] The shift register to which this invention operates with the clock of a predetermined frequency in order to attain the above-mentioned purpose, The sample hold circuit which samples and accumulates a video signal by making this shift register output into a sampling pulse, In the liquid crystal projector equipped with the liquid crystal panel driven with this sample hold circuit output at least Or it thins out a video signal according to the vertical position of a screen, it considers as the configuration which uses for coincidence the means which carries out writing of the image information which followed the same level Rhine of a liquid crystal panel twice, and a means to scan two or more horizontal scanning Rhine same signals.

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OPERATION

[Function] This invention changes perpendicular linearity according to a vertical position with the above-mentioned means, and it acts so that the image which offsets the perpendicular linearity distortion by slanting projection may be projected.

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EXAMPLE

[Example] In said liquid crystal projector equipment, if the image beforehand displayed by the liquid crystal panel for carrying out perpendicular linearity distortion amendment has linearity contrary to the aforementioned perpendicular linearity, the image which distortion is offset and does not have sense of incongruity should be acquired.

[0010] The perpendicular reality distortion amendment circuit of the one example liquid crystal projector of this invention is explained with reference to a drawing below. It is the sample hold circuit which samples a video signal and is held by making into a sampling pulse the output of the liquid crystal panel which drawing 1 is the block diagram of said amendment circuit, and is driven with the sample hold circuit output of the after-mentioned [1] as a component, the shift register which constitutes X driver to which 2 operates with the clock of predetermined frequency, the shift register which constitutes Y driver to which 3 and 4 similarly operate with the clock of predetermined frequency, and said shift register 3. Moreover, an amount directions means of amendments 5 is reset with a Vertical Synchronizing signal, and the number counter of level Rhine which counts a Horizontal Synchronizing signal, and 6 receive directions of the amount of amendments operated while an operator looks at a screen, and output the data according to the amount of amendments to the controller which controls the horizontal start pulse of a liquid crystal panel, and 7 are the level start pulse controllers which control a horizontal start pulse according to the data from the amount directions means 6 of amendments. Next, actuation of the perpendicular linearity distortion amendment circuit of the liquid crystal projector which consists of the above-mentioned component is explained. The number counter 5 of Rhine outputs first the signal which shows drive Rhine to the amount directions means 6 of amendments. The amount directions means 6 of amendments receives directions of the amount of amendments operated while an operator looks at a screen, determines by which vertical position infanticide (or overwrite) of an image and coincidence writing are performed, and sends the data to the level start pulse controller 7. The level start pulse controller 7 can shorten the vertical die length by culling out a video signal or building the same start pulse continuously by scanning the continuous video signal of two lines or more to the same level Rhine on a liquid crystal panel 1 by thinning out a start pulse according to the data from the amount directions means 6 of amendments. Moreover, coincidence is made to generate the start pulse of two or more continuous horizontal scanning Rhine, and the vertical die length can be extended by carrying out coincidence writing of the same signal to several lines. By the above actuation, the screen which offsets perpendicular linearity distortion is obtained on a liquid crystal panel.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram of the perpendicular linearity distortion amendment circuit of the liquid crystal projector of one example of this invention

[Drawing 2] The explanatory view of the distortion in slanting projection of a liquid crystal projector

[Description of Notations]

- 1 Liquid Crystal Panel
- 2 Shift Register Which Constitutes X Driver
- 3 Shift Register Which Constitutes Y Driver
- 4 Sample Hold Circuit Which Constitutes Y Driver
- 5 The Number Counter of Level Rhine
- 6 The Amount Directions Means of Amendments
- 7 Level Start Pulse Controller

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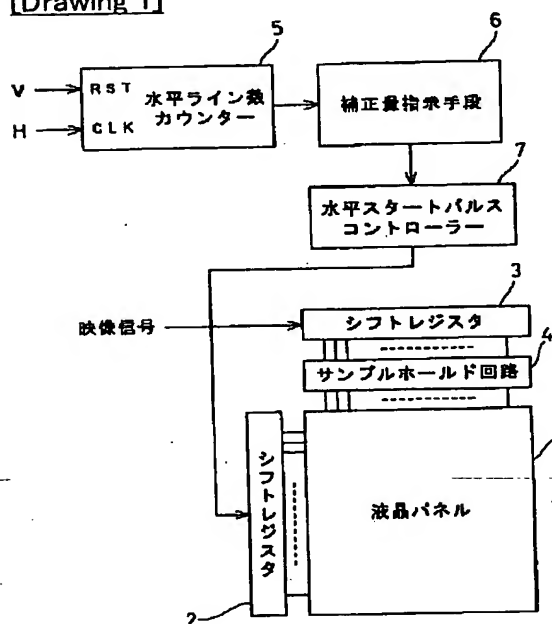
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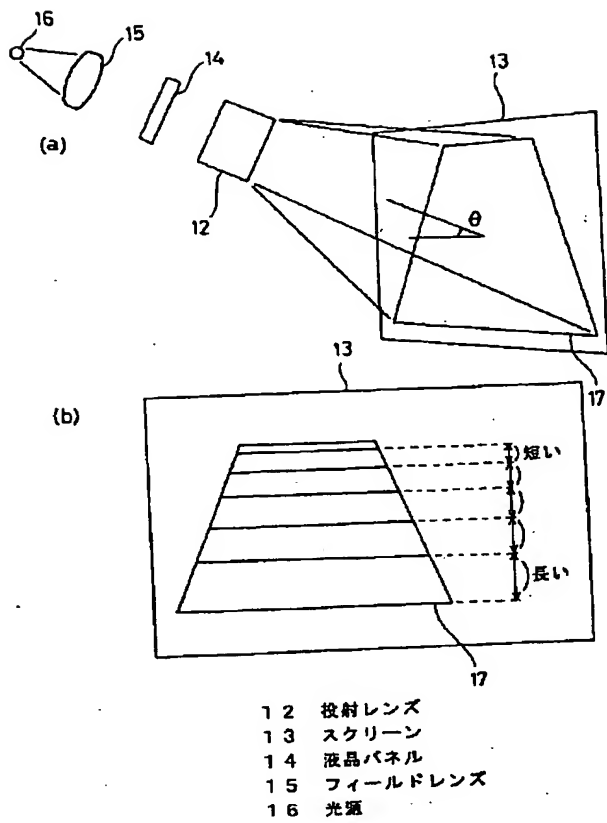
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DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]

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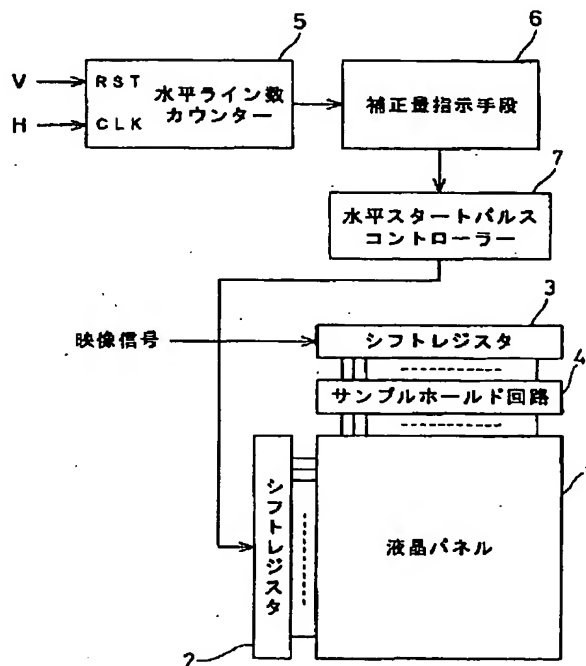
(74) 代理人 弁理士 森本 義弘

(54) 【発明の名称】 液晶プロジェクターの垂直リニアリティ歪み補正回路

(57) 【要約】

【目的】 本発明は、液晶プロジェクターにおいてスクリーン面に垂直な軸に対して、投写レンズの光軸を表示画面の垂直走査方向に所定の角度だけ傾斜させた際に発生する垂直リニアリティの歪みを補正する補正回路を提供することを目的とする。

【構成】 駆動ラインを出すライン数カウンタ5と、その信号を受け、どの垂直位置で映像間引き、書き換え、同時書きを行うかを決定する補正量指示手段6と、補正量指示手段6からのデータに応じてパルス間引きまたは同スタートパルスを得て垂直方向の長さを短縮または延長する水平スタートパルスコントローラ7を備え、画面の垂直位置に応じて映像信号を間引くあるいは液晶パネル1の同一水平ラインに連続した映像情報を2度書きする手段と2本以上の水平走査ラインに同一信号を走査してやる手段を2つ同時に用いて、斜め投射による垂直リニアリティ歪みを相殺する映像を投射し、垂直リニアリティ歪みの補正をする液晶プロジェクターの垂直リニアリティ歪み補正回路の構成とする。



【特許請求の範囲】

【請求項1】 所定周波数のクロックにより動作するシフトレジスタと、このシフトレジスタ出力をサンプリングパルスとして映像信号をサンプリングしホールドするサンプルホールド回路と、このサンプルホールド回路出力により駆動される液晶パネルを備える液晶プロジェクターにおいて、スクリーン面に垂直な軸に対して投写レンズの光軸を表示画面の垂直走査方向に所定の角度だけ傾斜させた際の垂直リニアリティの歪みを、画面の垂直位置に応じて映像信号を間引く手段と2本以上の水平走査ライン同一信号を走査する手段を同時に用いて、リニアリティ歪みを補正するようにしたことを特徴とする液晶プロジェクターの垂直リニアリティ歪み補正回路。

【請求項2】 所定周波数のクロックにより動作するシフトレジスタと、このシフトレジスタ出力をサンプリングパルスとして映像信号をサンプリングしホールドするサンプルホールド回路と、このサンプルホールド回路出力により駆動される液晶パネルを備える液晶プロジェクターにおいて、スクリーン面に垂直な軸に対して投写レンズの光軸を表示画面の垂直走査方向に所定の角度だけ傾斜させた際の垂直リニアリティの歪みを、画面の垂直位置に応じて映像信号を液晶パネルの同一水平ラインに連続した映像情報を2度書きする手段と2本以上の水平走査ライン同一信号を走査する手段を同時に用いて、リニアリティ歪みを補正する液晶プロジェクターの垂直リニアリティ歪み補正回路。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、全面投射型の液晶プロジェクターにおける垂直リニアリティ歪みを補正する補正回路に関する。

【0002】

【従来の技術】従来、全面投射型の液晶プロジェクターは、プロジェクター本体の存在がスクリーン上の投影画像の干渉の妨げになることがあるために、プロジェクター本体をスクリーンに対して傾斜して配置する場合が多く、この際スクリーンに対する投射角度が直角とならず、上下で画面横軸方向の長さが異なってくことはもちろん、画面の縦軸方向にも垂直リニアリティ歪みと呼ばれる歪みが発生する。

【0003】図2は液晶プロジェクター装置の基本原理解を示している。図2において、構成要素として12は投写レンズ、13はスクリーン、14は液晶パネル、15はフィールドレンズ、16は投写用光源、17はプロジェクターを上方から斜め投射した場合の投射映像である。以上の各構成要素よりなる液晶プロジェクター装置について、投写用光源16から出射された投射光はフィールドレンズ15により平行光に変換されて液晶パネル14に照射される。液晶パネル14を経た光は投写レンズ12により拡大投影されることにより、液晶パネル1

4に表示された画像がスクリーン13上に拡大投影される。

【0004】しかしここで、投写レンズ12の光軸がスクリーン13面に垂直な軸に対して θ の角度で入射すると、表示画面の垂直走査方向を頂点および底辺とする形状の台形歪みが生じることはもちろん、画面の縦軸方向にも垂直リニアリティ歪みと呼ばれる歪みが発生し、同図(b)に示すように画面の上方と下方では映像の垂直方向の伸びが異なってくる。このため、たとえば上方からの斜め投射の場合、画面下方が縦方向の映像の伸びが大きく、視覚上違和感のあるものであった。従来、横軸方向の歪みに対しては数種の補正方法が発表されている。

【0005】

【発明が解決しようとする課題】従来はこのように横軸方向の歪みは補正されて問題はないが、垂直リニアリティ歪みに対しては、対策が施されていない、歪みのない映像を現出させることができないという問題があった。

【0006】本発明は、前記問題に留意し、垂直リニアリティ歪みを無くし、視覚上違和感のない映像を提供することを目的とするものである。

【0007】

【課題を解決するための手段】上記目的を達成するために本発明は、所定の周波数のクロックにより動作するシフトレジスタと、このシフトレジスタ出力をサンプリングパルスとして映像信号をサンプリングし蓄積するサンプルホールド回路と、このサンプルホールド回路出力により駆動される液晶パネルを少なくとも備える液晶プロジェクターにおいて、画面の垂直位置に応じて映像信号を間引くまたは液晶パネルの同一水平ラインに連続した映像情報を2度書きする手段と2本以上の水平走査ライン同一信号を走査する手段を同時に用いる構成とする。

【0008】

【作用】上記手段により本発明は、垂直リニアリティを垂直位置に応じて変化させ、斜め投射による垂直リニアリティ歪みを相殺する映像を投射するように作用する。

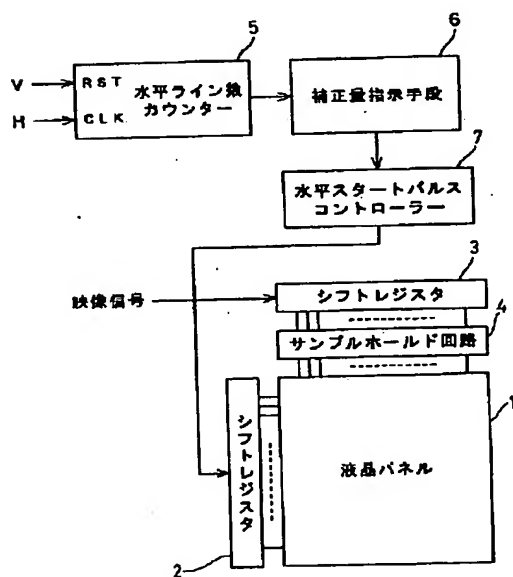
【0009】

【実施例】前記液晶プロジェクター装置において、垂直リニアリティ歪み補正するにはあらかじめ液晶パネルに表示される画像が前記の垂直リニアリティとは逆のリニアリティを持つようにすれば、歪みを相殺され違和感の無い映像が得られるはずである。

【0010】以下に本発明の一実施例液晶プロジェクターの垂直リニアリティ歪み補正回路を図面を参照して説明する。図1は前記補正回路のブロック図であり、構成要素として1は後述のサンプルホールド回路出力で駆動される液晶パネル、2は所定周波数のクロックにより動作するXドライバを構成するシフトレジスタ、3、4は同じく所定周波数のクロックにより動作するYドライバを構成するシフトレジスタおよび前記シフトレジスタ3の

出力をサンプリングパルスとして映像信号をサンプリングしホールドするサンプルホールド回路である。また、5は垂直同期信号でリセットされ、水平同期信号をカウントする水平ライン数カウンタ、6は操作者が画面を見ながら操作する補正量の指示を受け、その補正量に応じたデータを、液晶パネルの水平方向スタートパルスを制御するコントローラに出力する補正量指示手段、7は補正量指示手段6からのデータに応じて水平方向スタートパルスを制御する水平スタートパルスコントローラである。次に、上記構成要素よりなる液晶プロジェクタの垂直リニアリティ歪み補正回路の動作を説明する。まずライン数カウンタ5は駆動ラインを示す信号を補正量指示手段6に出力する。補正量指示手段6は操作者が画面を見ながら操作する補正量の指示を受け、どの垂直位置で映像の間引き（あるいは重ね書き）、同時書きを行うか決定し、水平スタートパルスコントローラ7にそのデータを送る。水平スタートパルスコントローラ7は補正量指示手段6からのデータに応じてスタートパルスを間引くことにより映像信号の間引きを行ったり、連続して同一のスタートパルスをたてることにより、連続した2ライン以上の映像信号を液晶パネル1上の同一水平ラインに走査することにより、垂直方向の長さを短縮することができる。また連続した2本以上の水

【図1】



平走査ラインのスタートパルスを同時に発生させ、同一信号を数ラインに同時書きすることで、垂直方向の長さを延長することができる。以上のような動作により、垂直リニアリティ歪みを相殺する画面が液晶パネル上で得られる。

【0011】

【発明の効果】以上の実施例の説明から明らかなように、本発明は、液晶プロジェクタの斜め投射における垂直リニアリティ歪みを無くすることができる。

【図面の簡単な説明】

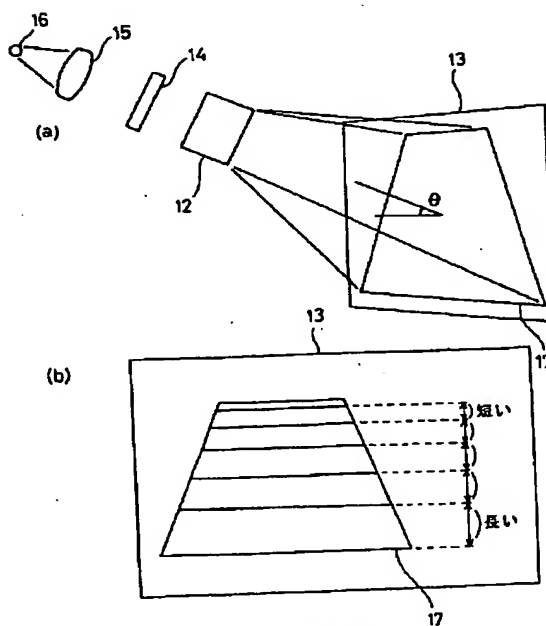
【図1】本発明の一実施例の液晶プロジェクタの垂直リニアリティ歪み補正回路のブロック図

【図2】液晶プロジェクタの斜め投射における歪みの説明図

【符号の説明】

- 1 液晶パネル
- 2 Xドライバを構成するシフトレジスタ
- 3 Yドライバを構成するシフトレジスタ
- 4 Yドライバを構成するサンプルホールド回路
- 5 水平ライン数カウンタ
- 6 補正量指示手段
- 7 水平スタートパルスコントローラ

【図2】



- 12 投射レンズ
- 13 スクリーン
- 14 液晶パネル
- 15 フィールドレンズ
- 16 光源